IN THE CLAIMS

Please amend the claims as follows:

1. (Currently Amended) A surface-heating system comprising:

a frequency generator to generate a millimeter-wave frequency; and

an antenna system to provide ~~either~~ a collimated ~~or converging~~ high-power wavefront at the millimeter-wave frequency in a direction of a surface to heat the surface within a surface depth.

2. (Currently Amended) The system of claim 1 wherein the antenna system comprises an active array having a plurality of semiconductor wafers arranged together, wherein each semiconductor wafer comprises:

one or more sets of power amplifiers to amplify the millimeter-wave frequency; and

one or more transmit antennas to generate ~~either~~ the collimated ~~or converging~~ high-power wavefront,

wherein each set of power amplifiers is associated with one of the transmit antennas.

3. (Original) The system of claim 2 wherein the active array is an active reflect-array to receive a spatially fed millimeter-wave lower-power wavefront, to amplify the lower-power wavefront, and to generate the high-power wavefront.

4. (Currently Amended) The system of claim 3 wherein the plurality of semiconductor wafers is arranged in a substantially parabolic shape, and each semiconductor wafer includes:

one or more receive antennas to receive the spatially fed millimeter-wave lower-power wavefront;

one or more sets of power amplifiers to amplify signals of the spatially fed millimeter-wave lower-power wavefront; and

one or more transmit antennas to transmit the amplified signals to generate ~~either~~ the collimated ~~or converging~~ high-power wavefront,

wherein each set of power amplifiers is associated with one of the transmit and one of the receive antennas.

5. (Original) The system of claim 3 further comprising a low-power feed to provide the lower-power wavefront at the millimeter-wave frequency for incident on the active reflect-array.

6. (Original) The system of claim 2 wherein the frequency generator and antenna system are part of a wavefront-generating subsystem, the system further comprising a thermal-sensing subsystem to measure a surface temperature and generate a control signal for the wavefront-generating subsystem to control the surface temperature.

7. (Original) The system of claim 6 wherein the antenna system generates a continuous-wave wavefront, and wherein the antenna system changes a transmit power level of the wavefront in response to the control signal from the thermal-sensing subsystem to control the surface temperature.

8. (Original) The system of claim 6 wherein the antenna system generates a pulsed high-power wavefront, and wherein the antenna system reduces one of either a pulse-repetition-rate or a pulse-duration time of the high-power wavefront in response to the control signal to control the surface temperature.

9. (Original) The system of claim 2 further comprising a housing having a cavity for placement of a food item, and wherein the active array is one of a plurality of active arrays positioned within the cavity to direct a plurality of high-power millimeter-wave wavefronts within the cavity to heat a surface of the food item.

10. (Original) The system of claim 9 further comprising a microwave amplifier and associated antenna to direct microwave energy within the cavity to heat the food item below the surface.

11. (Original) The system of claim 5 wherein the low-power feed amplifies and reflects millimeter-wave signals received from a source within of the active reflect-array, the low-power feed comprising:

one or more receive antennas to receive the millimeter-wave signals from the source;

one or more amplifiers to amplify the received millimeter-wave frequency signals; and

one or more transmit antennas to transmit the amplified millimeter-wave signals and generate the lower-power wavefront for incidence on the active reflect-array.

12. (Original) The system of claim 3 further comprising a passive reflector to reflect a millimeter-wave frequency signal from a feed and provide the lower-power wavefront for incident on the active reflect-array.

13. (Original) The system of claim 2 wherein the plurality of semiconductor wafers is arranged on a substantially flat surface.

14. (Original) The system of claim 2 further comprising

a low-voltage, high-current power supply to generate current for the active array and frequency generator; and

a cooling subsystem to cool the active array and the power supply,

wherein the cooling system comprises one of either a thermo-electric-cooling (TEC) element, a phase change fluid, or coolant.

15. (Currently Amended) The system of claim 1 wherein the antenna system is a passive reflect-array antenna system and comprises:

a high-power amplifier to generate a high-power millimeter-wave frequency signal;

a reflector to reflect the high-power signal; and

a passive reflect antenna to receive the reflected high-power signal and re-transmit the signal to generate ~~either~~ the collimated ~~or the converging~~ high-power wavefront.

16. (Original) The system of claim 15 wherein the passive reflect antenna is comprised of a plurality of dual-polarized dipoles of varying sizes arranged circumferentially in a substantially flat surface.

17. (Original) The system of claim 1 wherein the frequency generator is configured to generate a plurality of differing millimeter-wave frequencies, and wherein the antenna system provides the high-power wavefront comprising the differing millimeter-wave frequencies, and wherein the system further comprises a system controller to control a frequency and power level of the wavefront to selectively heat layers of the surface.

18. (Original) The system of claim 17 wherein the high-power wavefront comprising the differing millimeter-wave frequencies is time-multiplexed with differing millimeter-wave frequencies.

19. (Currently Amended) The system of claim 1 wherein the antenna system is configured to provide ~~either~~ the collimated high-power wavefront~~, the converting high-power wavefront, or a diverging high-power wavefront~~.

20. (Withdrawn) A system for browning food comprising:

a housing having a cavity; and

a plurality of active-arrays within the cavity to direct a plurality of high-power millimeter-wave wavefronts within the cavity to heat a surface of a food item placed therein,

wherein the wavefronts are either collimated or converging high-power wavefronts at a millimeter-wave frequency.

21. (Withdrawn) The system of claim 20 wherein active arrays have a plurality of semiconductor wafers arranged on a substantially flat surface, wherein each semiconductor wafer comprises:

one or more sets of power amplifiers to amplify a millimeter-wave frequency signal; and

one or more transmit antennas to generate either the collimated or converging high-power wavefronts,

wherein each set of power amplifiers is associated with one of the transmit antennas.

22. (Withdrawn) The system of claim 20 further comprising:

a thermal-sensing subsystem to measure a surface temperature of the food item and generate a control signal to maintain the surface temperature substantially within a predetermined temperature range; and

a microwave amplifier and associated antenna to direct microwave energy within the cavity to heat the food item below the surface.

23. (Withdrawn) The system of claim 22 wherein the active arrays generate a continuous-wave wavefront, and wherein a transmit power level of the wavefront is changed in response to the control signal from the thermal-sensing subsystem to control the surface temperature.

24. (Withdrawn) The system of claim 22 wherein the active arrays generate a pulsed high-power wavefront, and wherein one of either a pulse-repetition-rate or a pulse-duration time of the high-power wavefront is changed in response to the control signal to control the surface temperature.

25. (Withdrawn) The system of claim 20 further comprising a frequency generator to generate a plurality of differing millimeter-wave frequencies, and wherein the active arrays provide the high-power wavefronts comprising the differing millimeter-wave frequencies, and wherein the system further comprises a system controller to control a frequency and power level of the wavefronts to selectively heat layers of the surface.

26. (Withdrawn) The system of claim 25 wherein the high-power wavefronts comprising the differing millimeter-wave frequencies are time-multiplexed with the differing millimeter-wave frequencies.

27. (Withdrawn) A system for removing paint on a surface comprising:

a frequency generator to generate a millimeter-wave frequency; and

an antenna system to provide either a collimated or converging high-power wavefront at the millimeter-wave frequency in a direction of a surface to heat the surface to within a surface depth,

wherein the antenna system comprises an active array having a plurality of semiconductor wafers arranged on a surface, wherein each semiconductor wafer comprises:

one or more sets of power amplifiers to amplify the millimeter-wave frequency; and

one or more transmit antennas to generate either the collimated or converging high-power wavefront,

wherein each set of power amplifiers is associated with one of the transmit antennas.

28. (Withdrawn) The system of claim 27 wherein the active array is an active reflect-array to receive a spatially fed millimeter-wave lower-power wavefront, amplify the lower-power wavefront, and generate the high-power wavefront, and

wherein the plurality of semiconductor wafers is arranged in a substantially parabolic shape, and wherein each semiconductor wafer includes:

one or more receive antennas to receive the spatially fed millimeter-wave lower-power wavefront;

one or more sets of power amplifiers to amplify signals of the spatially fed millimeter-wave lower-power wavefront; and

one or more transmit antennas to transmit the amplified signals to generate either the collimated or converging high-power wavefront,

wherein each set of power amplifiers is associated with one of the transmit and one of the receive antennas.

29. (Withdrawn) The system of claim 28 further comprising a thermal-sensing subsystem to measure a surface temperature and generate a control signal for the wavefront-generating subsystem to control the surface temperature.

30. (Withdrawn) The system of claim 29 wherein the antenna system generates a continuous-wave wavefront, and wherein the antenna system changes a transmit power level of the wavefront in response to the control signal from the thermal-sensing subsystem to control the surface temperature.

31. (Withdrawn) The system of claim 29 wherein the antenna system generates a pulsed high-power wavefront, and wherein the antenna system reduces one of either a pulse-repetition-rate or a pulse-duration time of the high-power wavefront in response to the control signal to control the surface temperature.

32. (Withdrawn) A method of heating a surface comprising generating either a collimated or converging high-power wavefront at the millimeter-wave frequency in a direction of a surface using a semiconductor-based active array antenna.

33. (Withdrawn) The method of claim 32 further comprising:

measuring a surface temperature and generating a control signal to control the surface temperature; and

changing either a transmit power level of the wavefront, a pulse-repetition-rate of the wavefront, or a pulse-duration time of the wavefront in response to the control signal from the thermal-sensing subsystem to control the surface temperature.

34. (Withdrawn) The method of claim 33 wherein generating comprises:

receiving a spatially-fed lower-power millimeter-wave wavefront incident on an active reflect array comprising a plurality of semiconductor wafers arranged on a surface having receive antennas thereon;

amplifying signals of the received lower-power wavefront with power amplifiers on the wafers; and

retransmitting the signals of the received wavefront to generate the high-power wavefront in the direction of the surface with transmit antennas on the wafers.

35. (Withdrawn) The method of claim 32 wherein generating comprises generating a plurality of differing millimeter-wave frequencies to provide the high-power wavefront comprising the differing millimeter-wave frequencies, and

wherein the method further comprises controlling a frequency and power level of the wavefront to selectively heat layers of the surface.

36. (Withdrawn) The method of claim 35 further comprising time-multiplexing the differing millimeter-wave frequencies of the high-power wavefront to selectively heat layers of the surface.

37. (Withdrawn) The method of claim 32 wherein generating comprises generating either the collimated high-power wavefront, the converting high-power wavefront, or a diverging high-power wavefront.